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Mindler et al.

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(45) **Date of Patent: Mar. 15, 2011**

(54) **PRINTER WITH VARIABLE LEAD ADVANCE**

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(73) Assignee: **Eastman Kodak Company**, Rochester, NY (US)

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(22) Filed: **Dec. 23, 2005**

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G06K 15/00 (2006.01)

(52) **U.S. Cl.** **358/1.12**

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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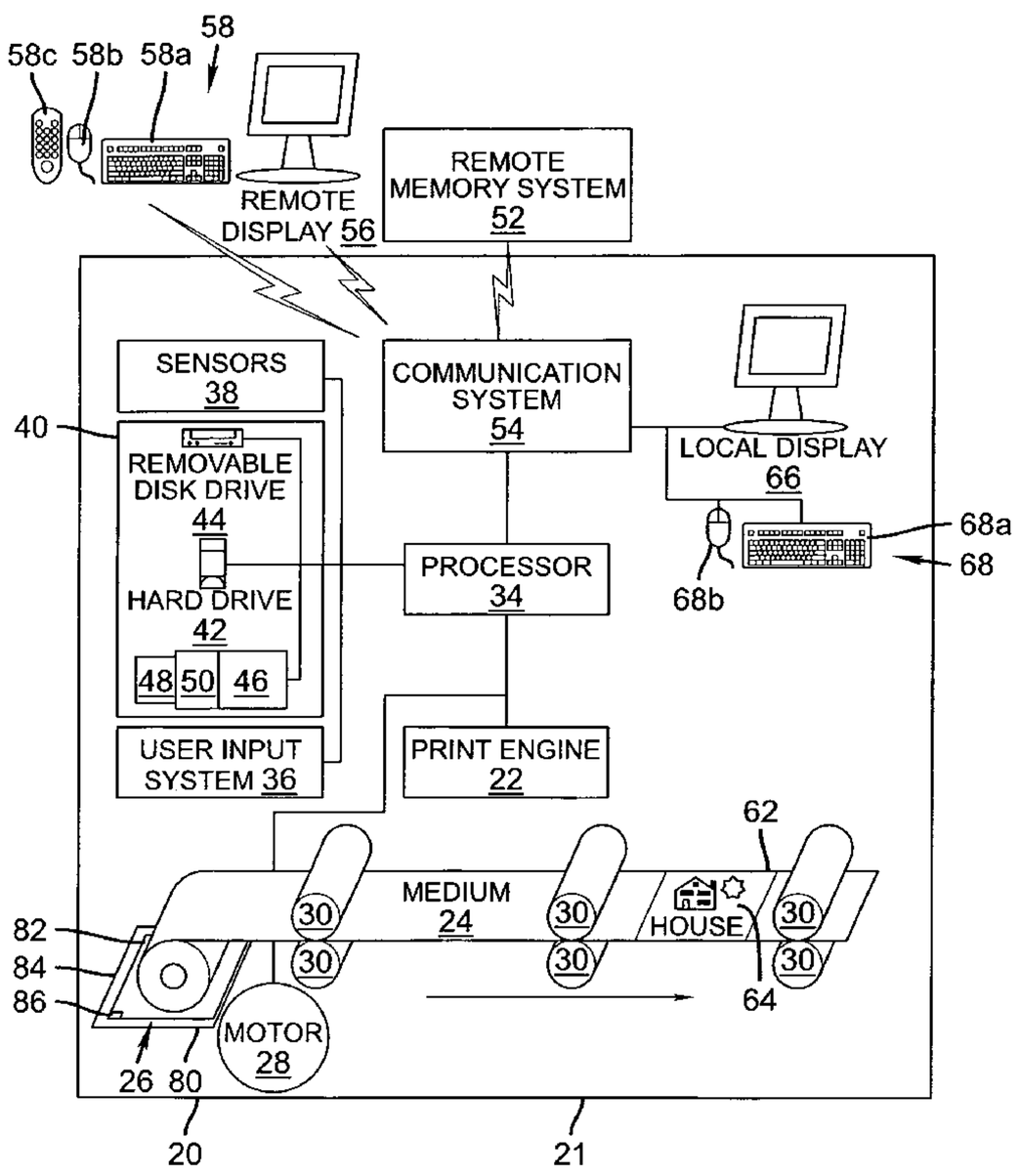
(57) **ABSTRACT**

A printer and method for operating a printer are provided that prints using a receiver medium having a rolled portion with an outermost layer from which an unrolled portion extends to a print engine. The method comprises: sensing a condition indicating the receiver medium may have been contacted by other than a component of the printer or by a donor material applied by the print engine; measuring an aspect of the receiver medium indicative of the circumferential length of the outermost layer; determining a circumferential length of the receiver medium based upon the measured aspect of the rolled portion of the receiver medium; determining an exclusion length of the receiver medium based upon the determined circumferential length and a travel distance that is a representation of a length of the unrolled portion between the rolled portion and the print engine; and automatically advancing the receiver medium by the exclusion length.

17 Claims, 14 Drawing Sheets



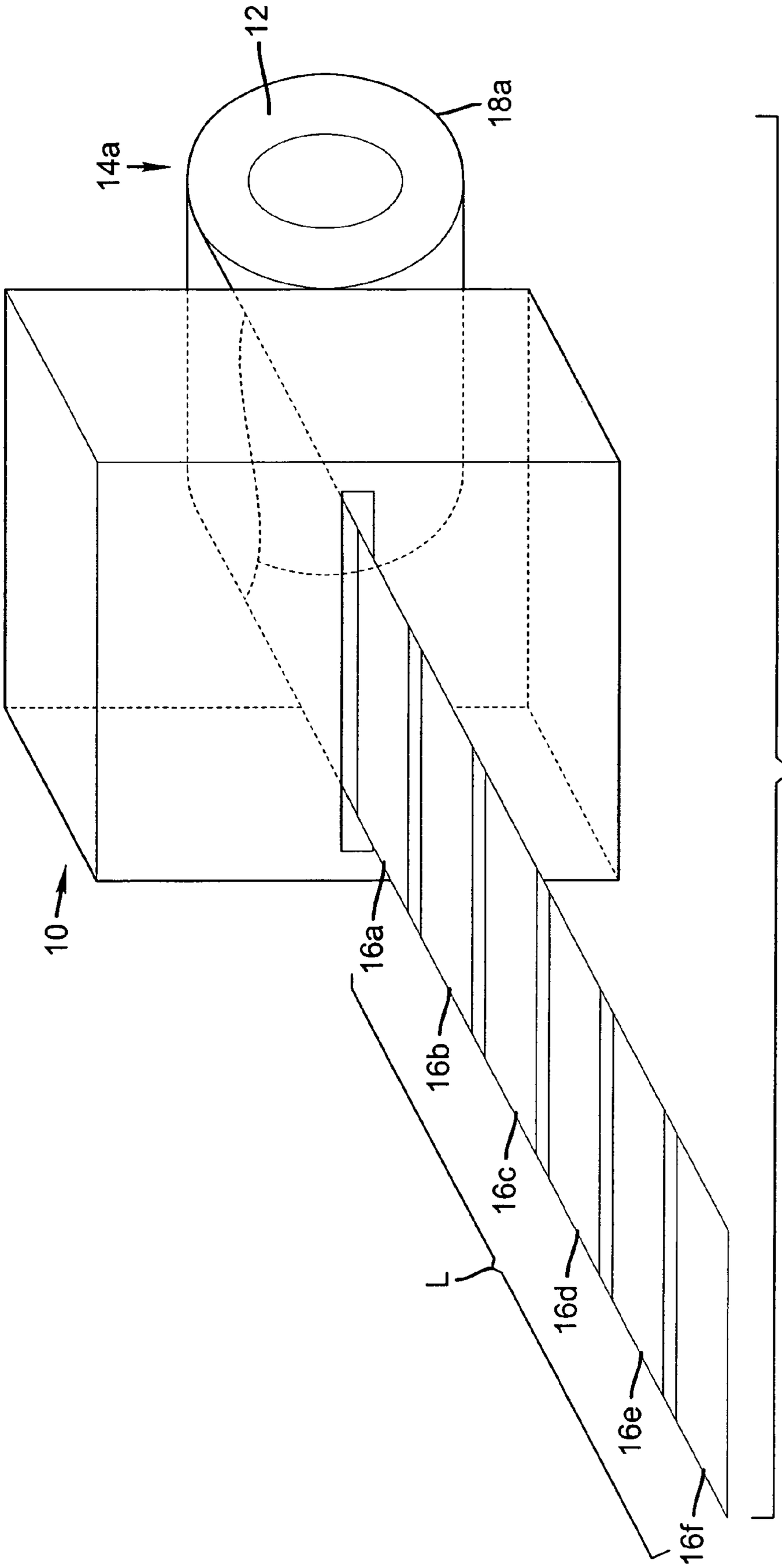


FIG. 1
PRIOR ART

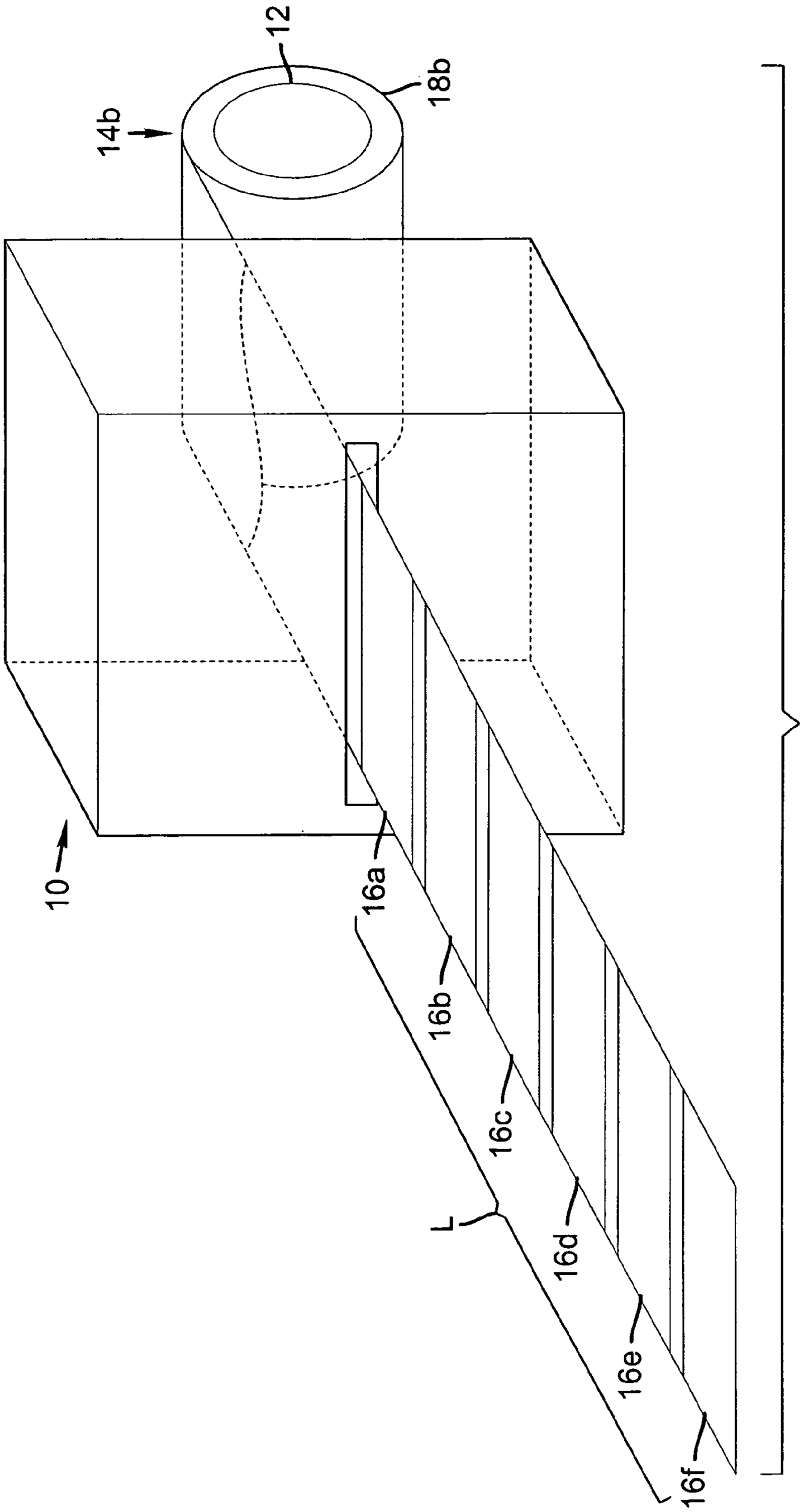


FIG. 2
PRIOR ART

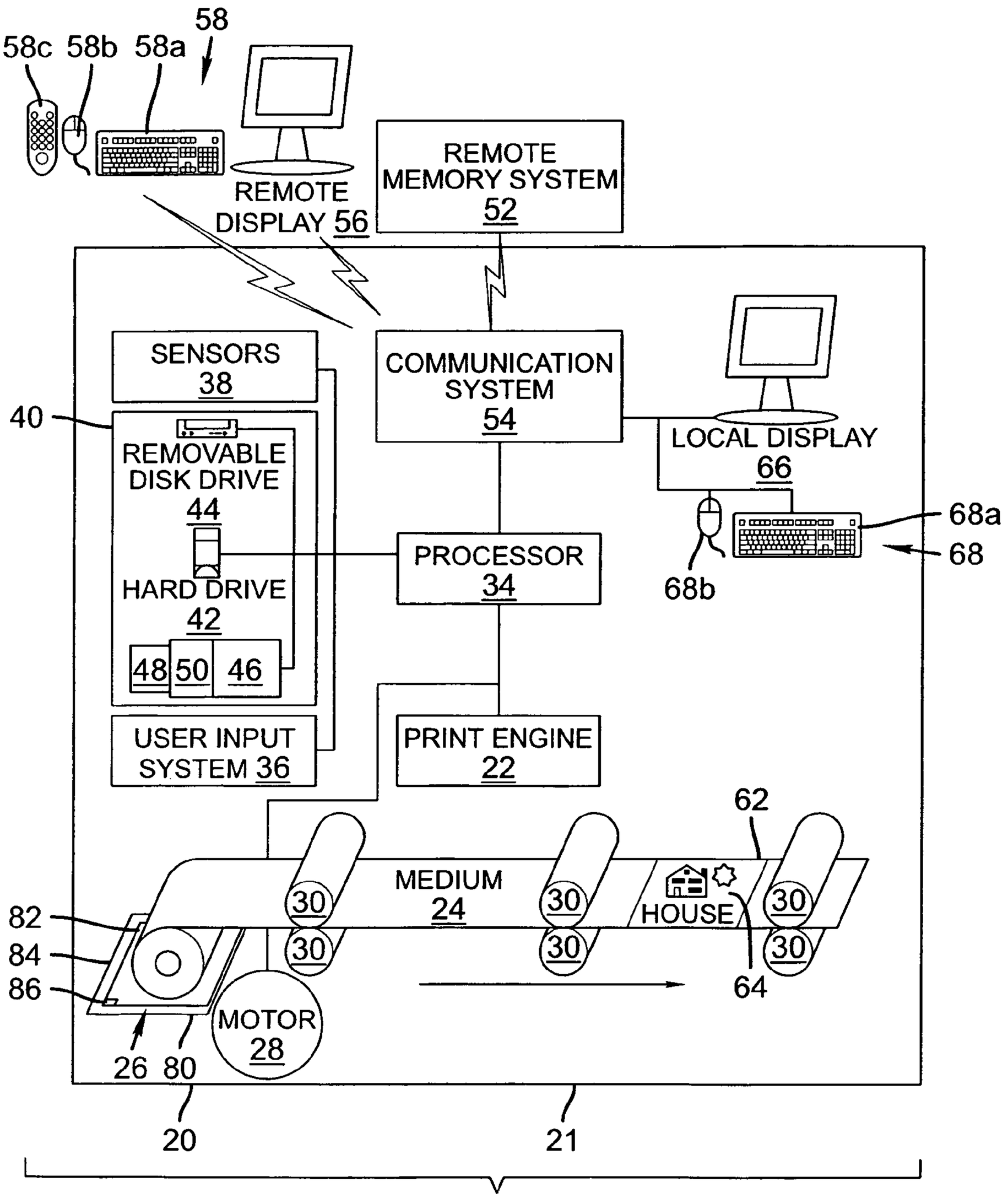

58
58c
58b
58a
REMOTE DISPLAY 56
REMOTE MEMORY SYSTEM 52
SENSORS 38
COMMUNICATION SYSTEM 54
LOCAL DISPLAY 66
40
REMOVABLE DISK DRIVE 44
HARD DRIVE 42
48
50
46
PROCESSOR 34
68a
68
68b
USER INPUT SYSTEM 36
PRINT ENGINE 22
62
MEDIUM 24
30
HOUSE
64
82
84
86
MOTOR 28
26
80
20
21

FIG. 3

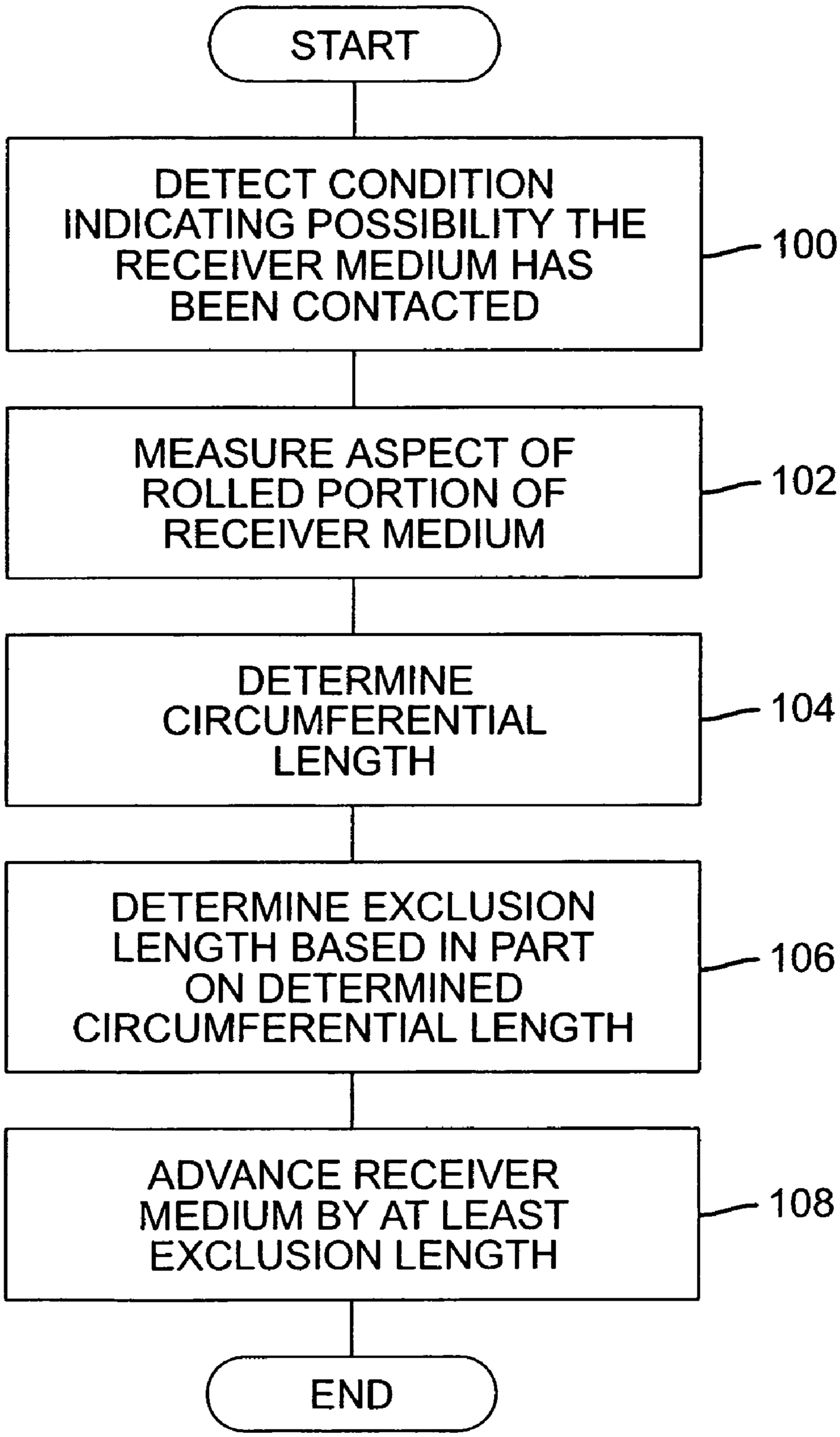

START
DETECT CONDITION INDICATING POSSIBILITY THE RECEIVER MEDIUM HAS BEEN CONTACTED
100
MEASURE ASPECT OF ROLLED PORTION OF RECEIVER MEDIUM
102
DETERMINE CIRCUMFERENTIAL LENGTH
104
DETERMINE EXCLUSION LENGTH BASED IN PART ON DETERMINED CIRCUMFERENTIAL LENGTH
106
ADVANCE RECEIVER MEDIUM BY AT LEAST EXCLUSION LENGTH
108
END

FIG. 4

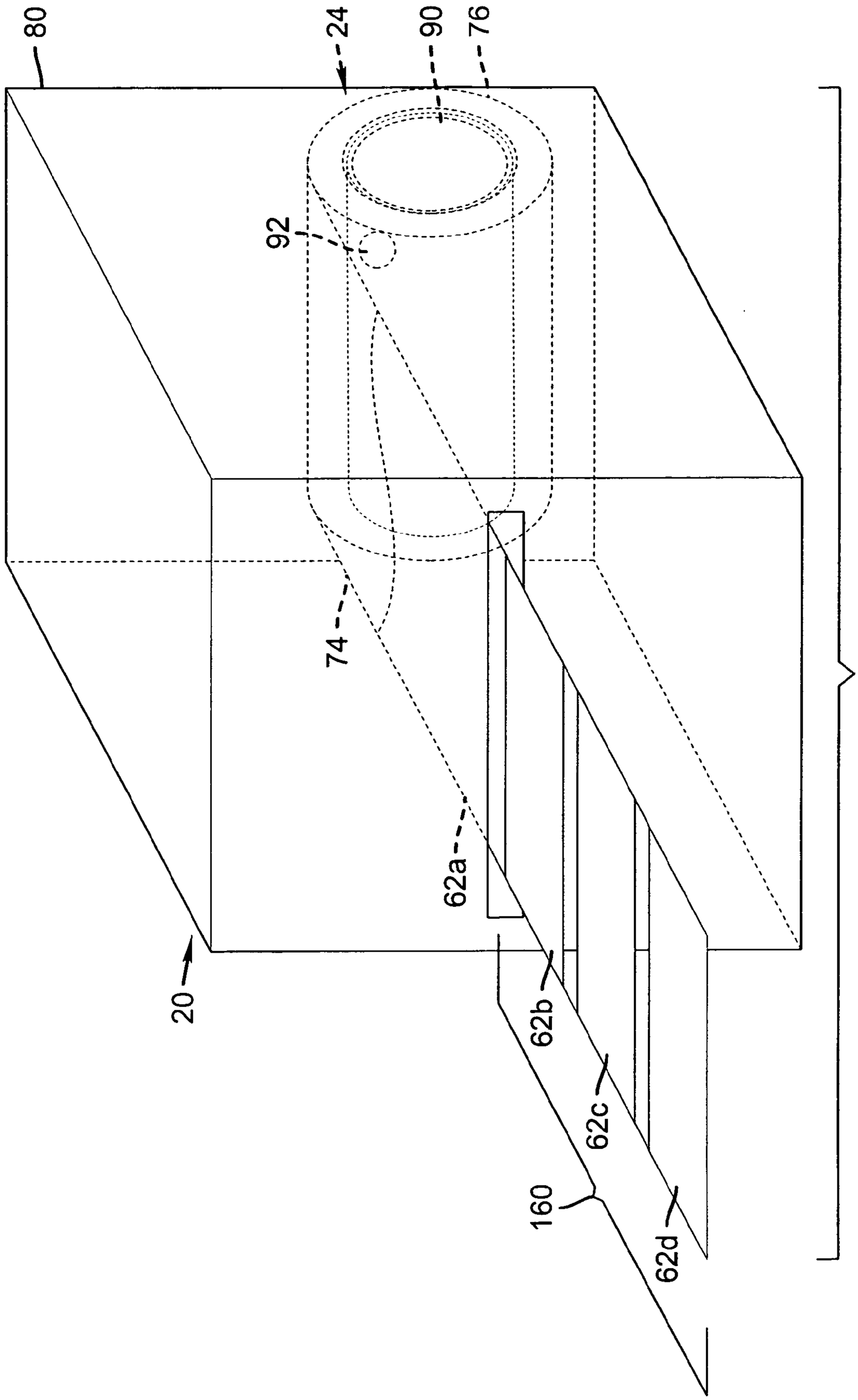


FIG. 5

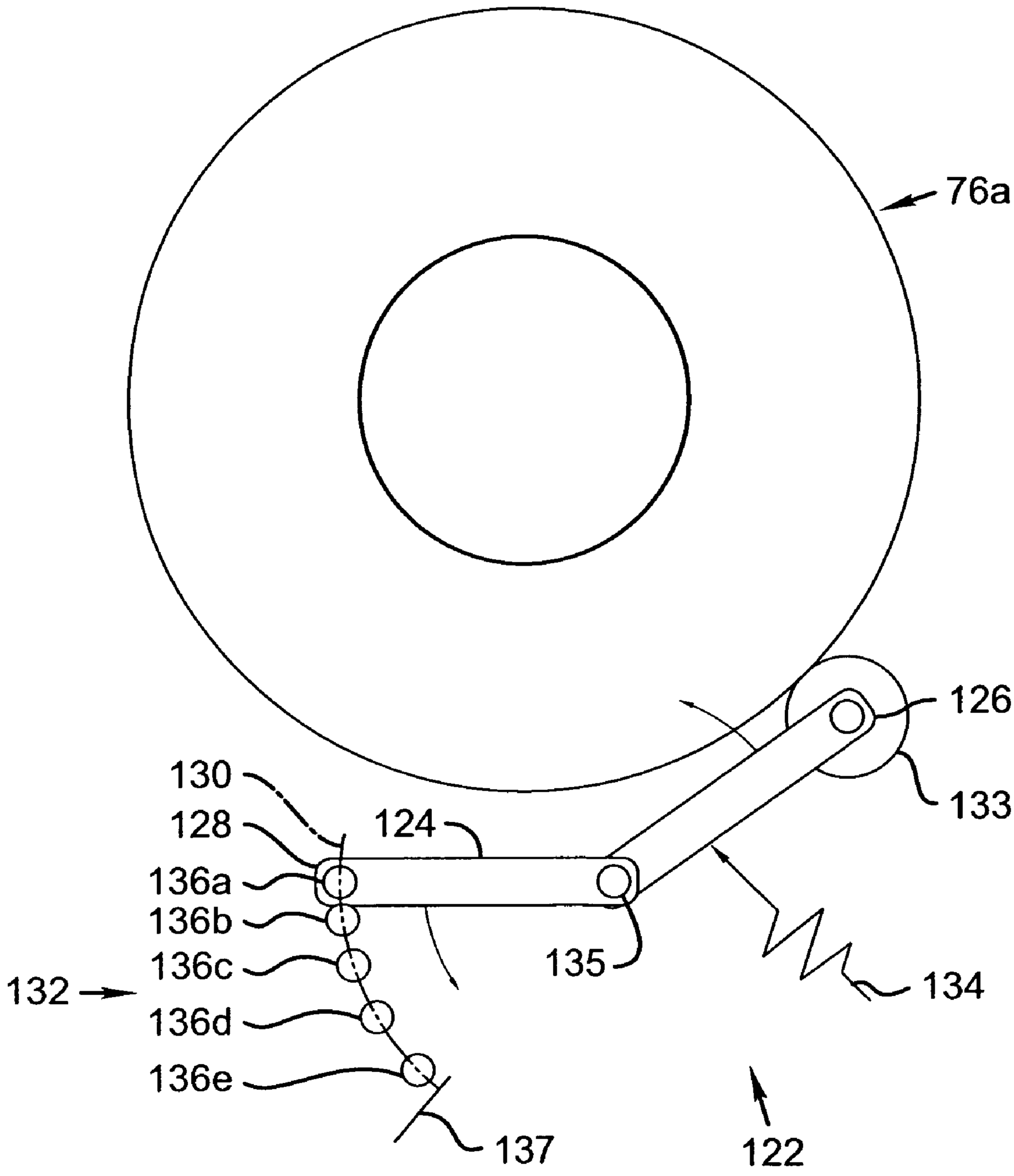

76a
126
133
130
128
124
136a
136b
136c
132
136d
136e
135
134
137
122

FIG. 6

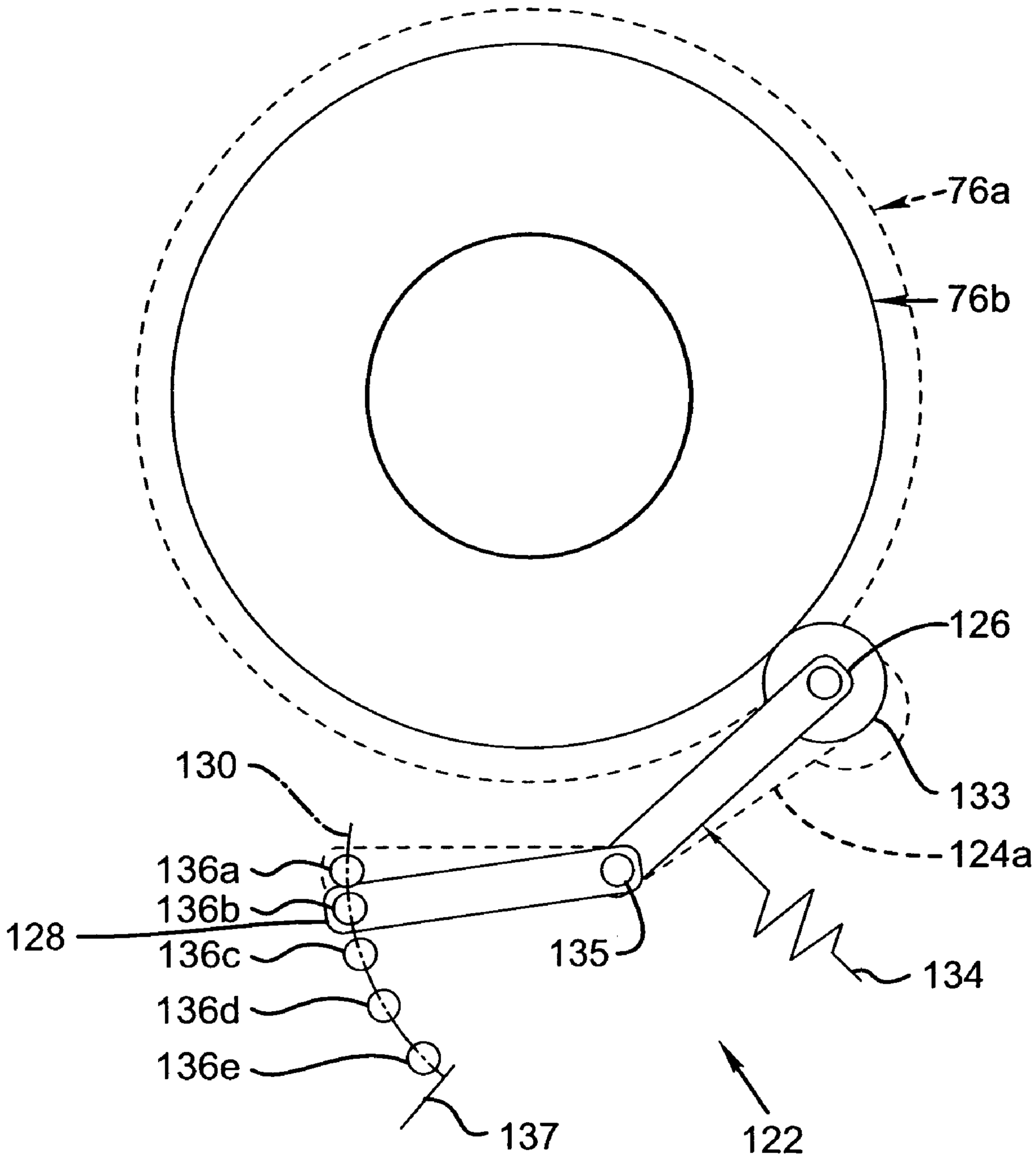

76a
76b
126
130
133
124a
136a
136b
128
136c
135
134
136d
136e
137
122

FIG. 7

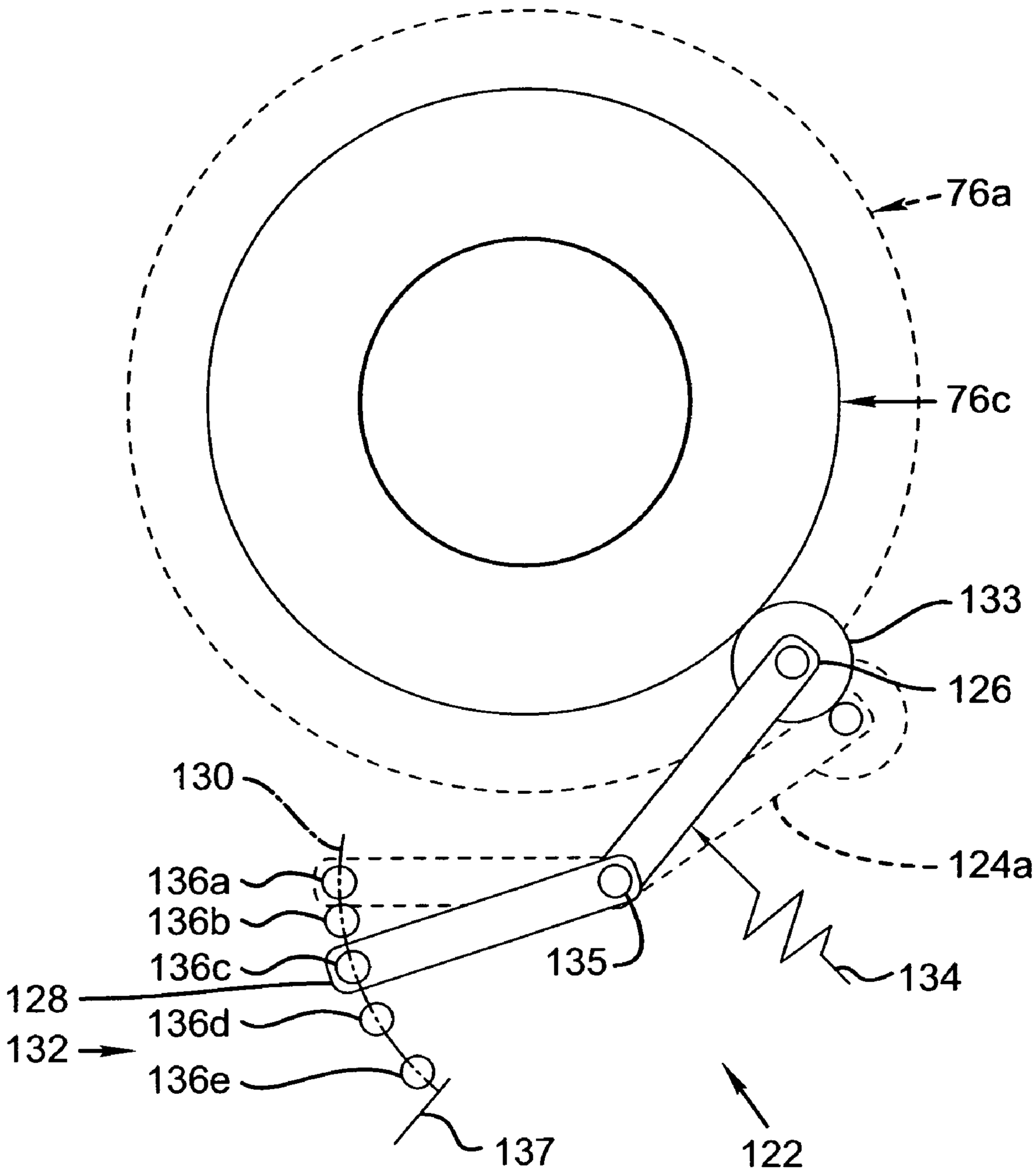

76a
76c
133
126
130
136a
136b
136c
128
136d
132
136e
137
135
134
124a
122

FIG. 8

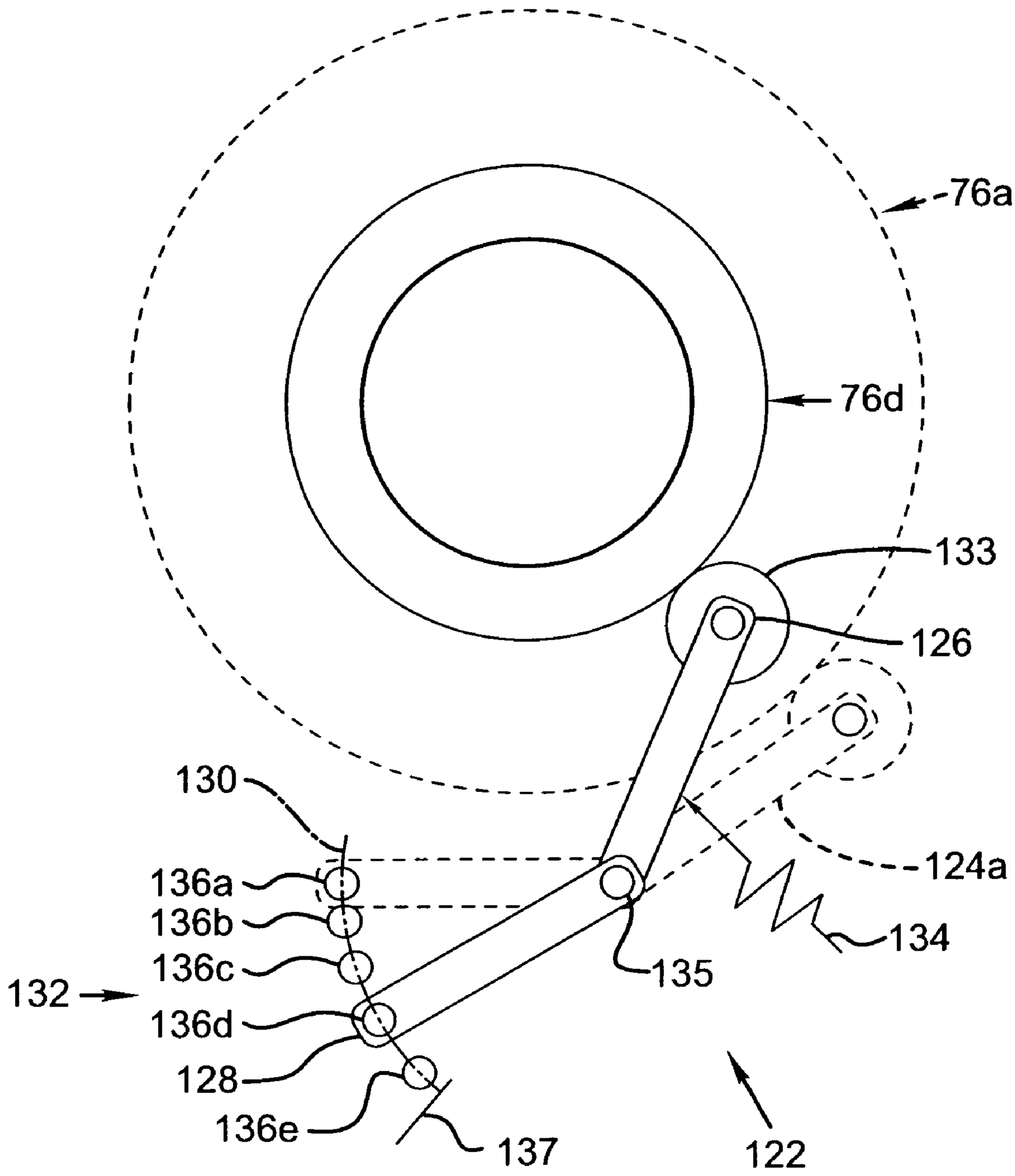

76a
76d
133
126
130
136a
136b
136c
132
136d
128
136e
137
135
134
124a
122

FIG. 9

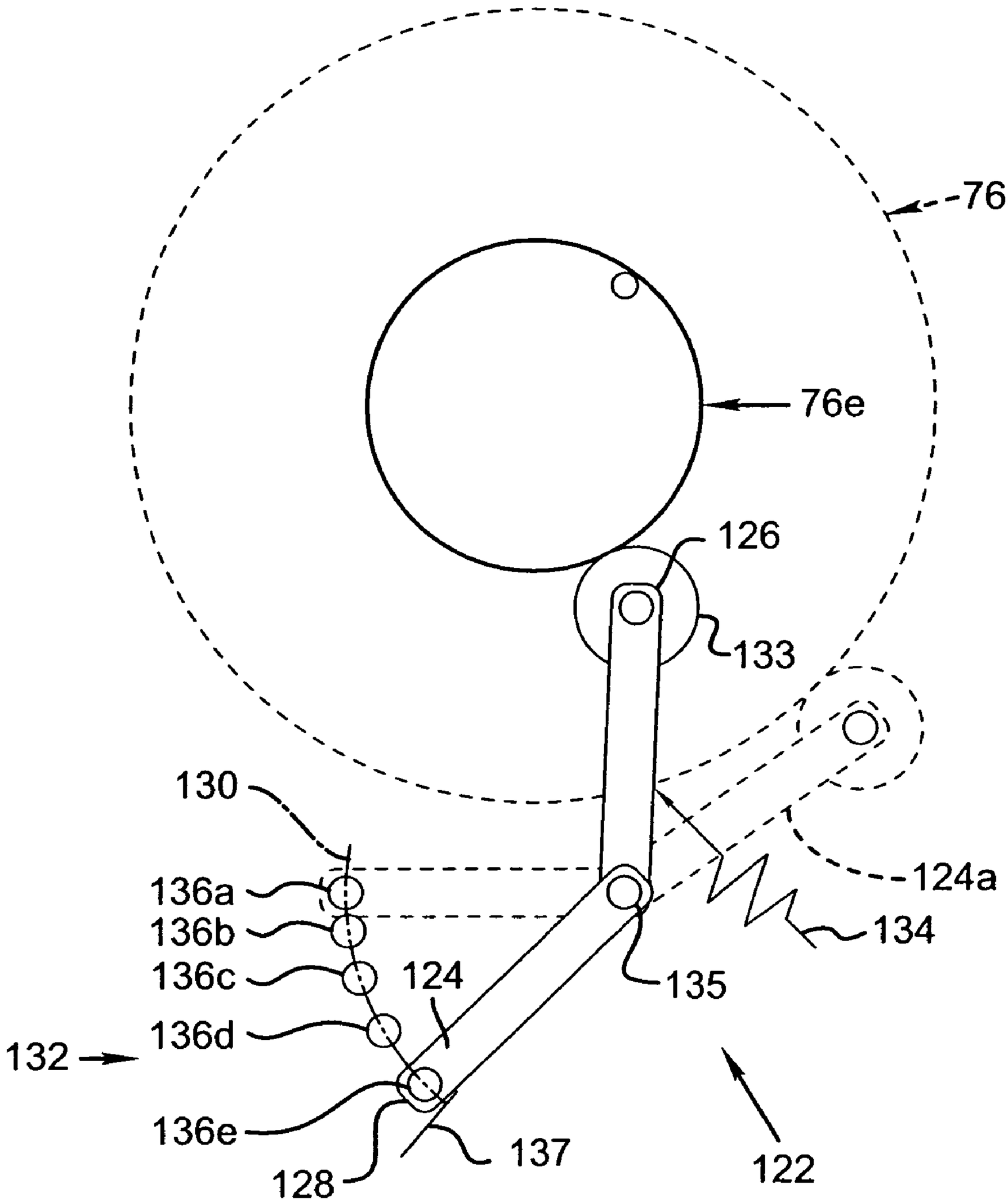

76a
76e
126
133
130
136a
136b
136c
136d
132
136e
128
124
137
135
134
124a
122

FIG. 10

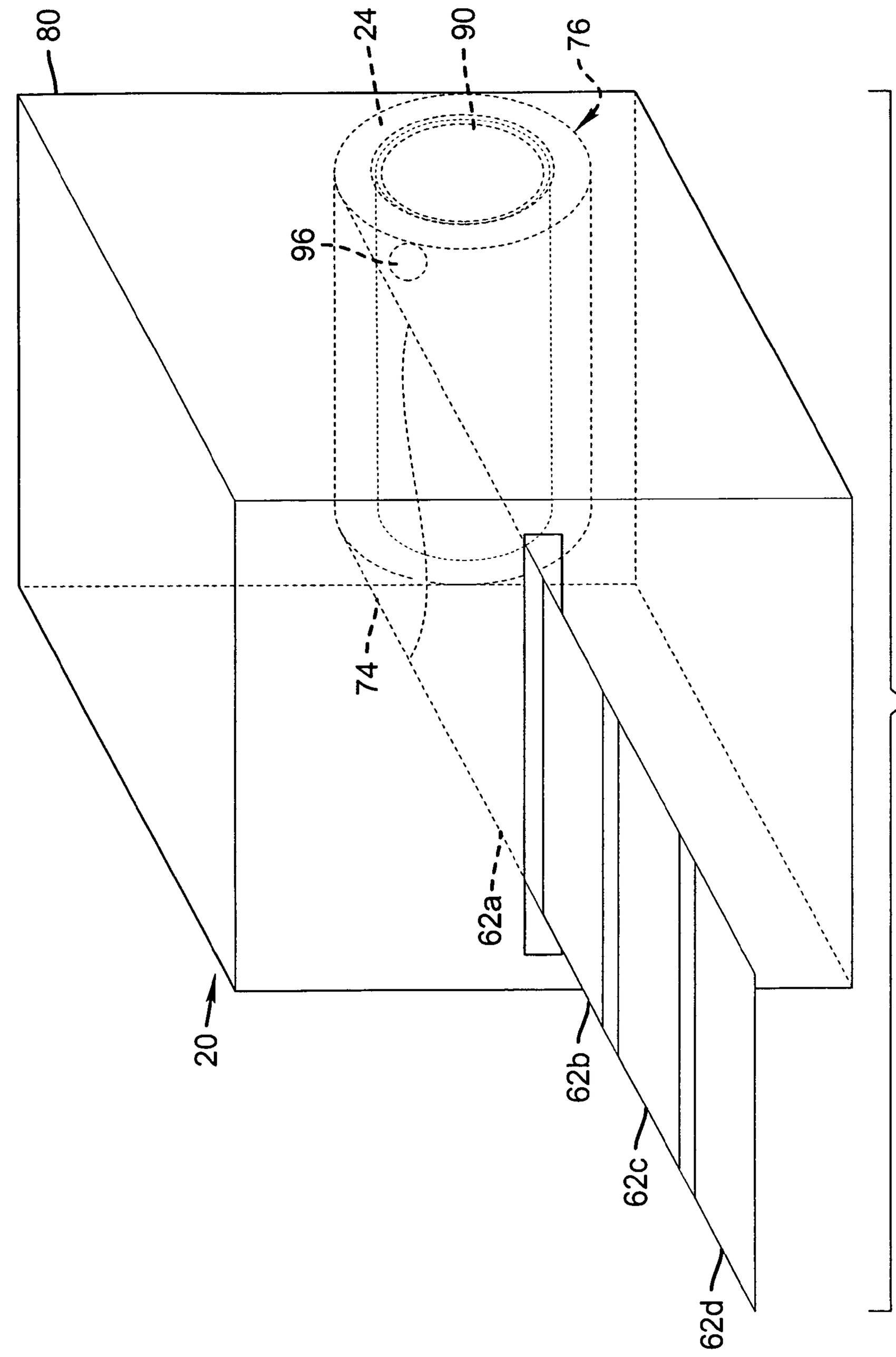


FIG. 11

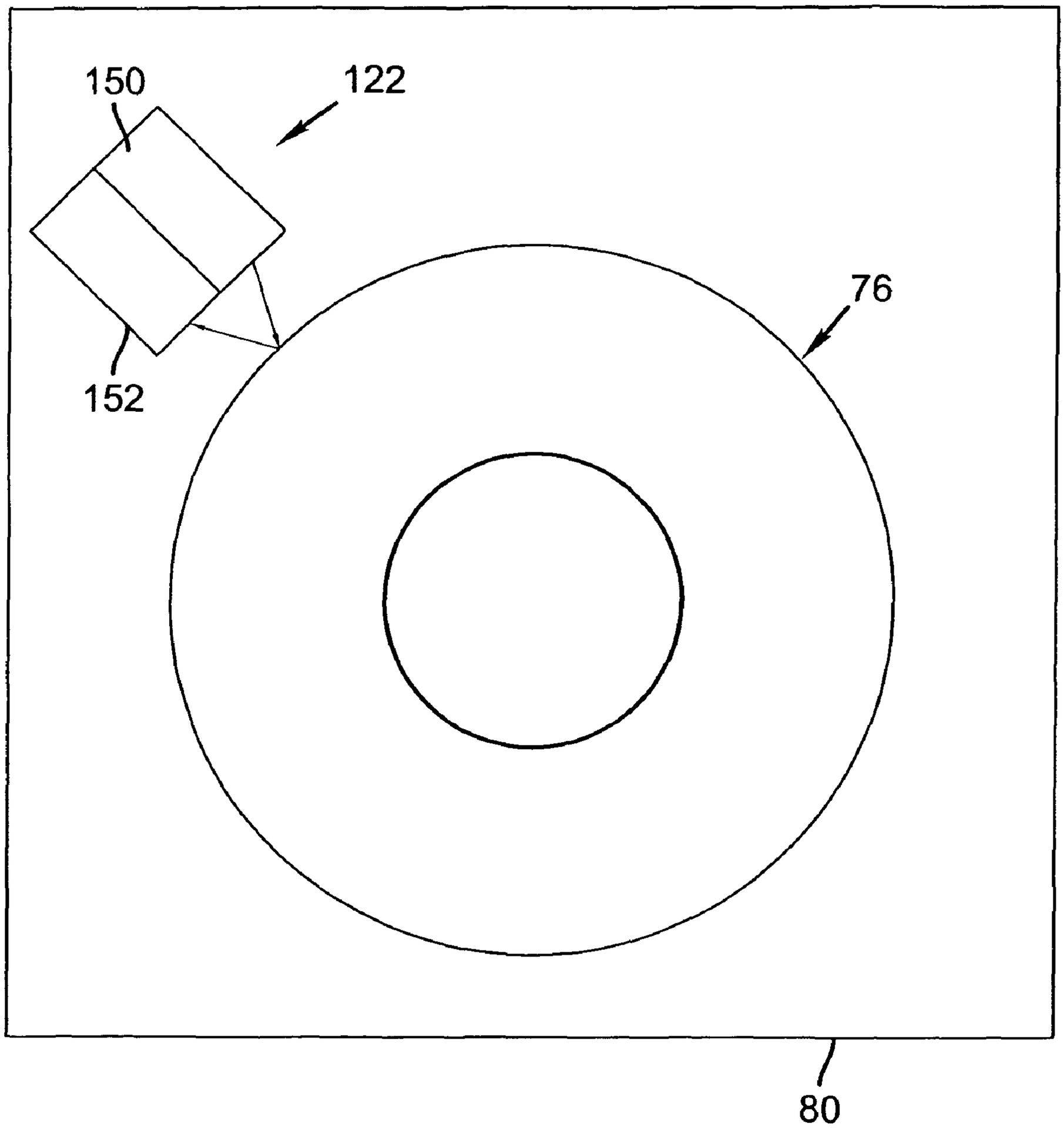


FIG. 12

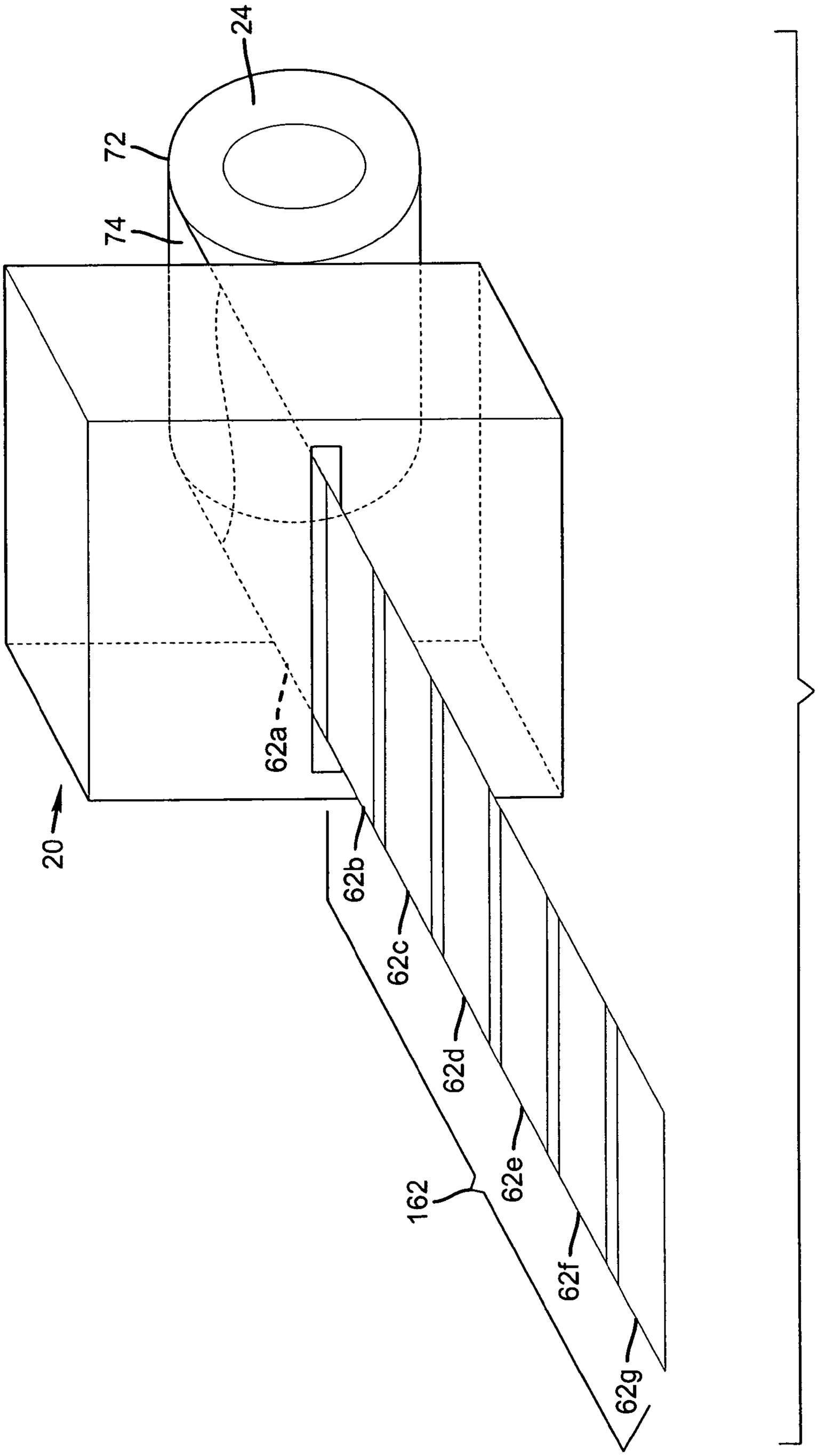


FIG. 13

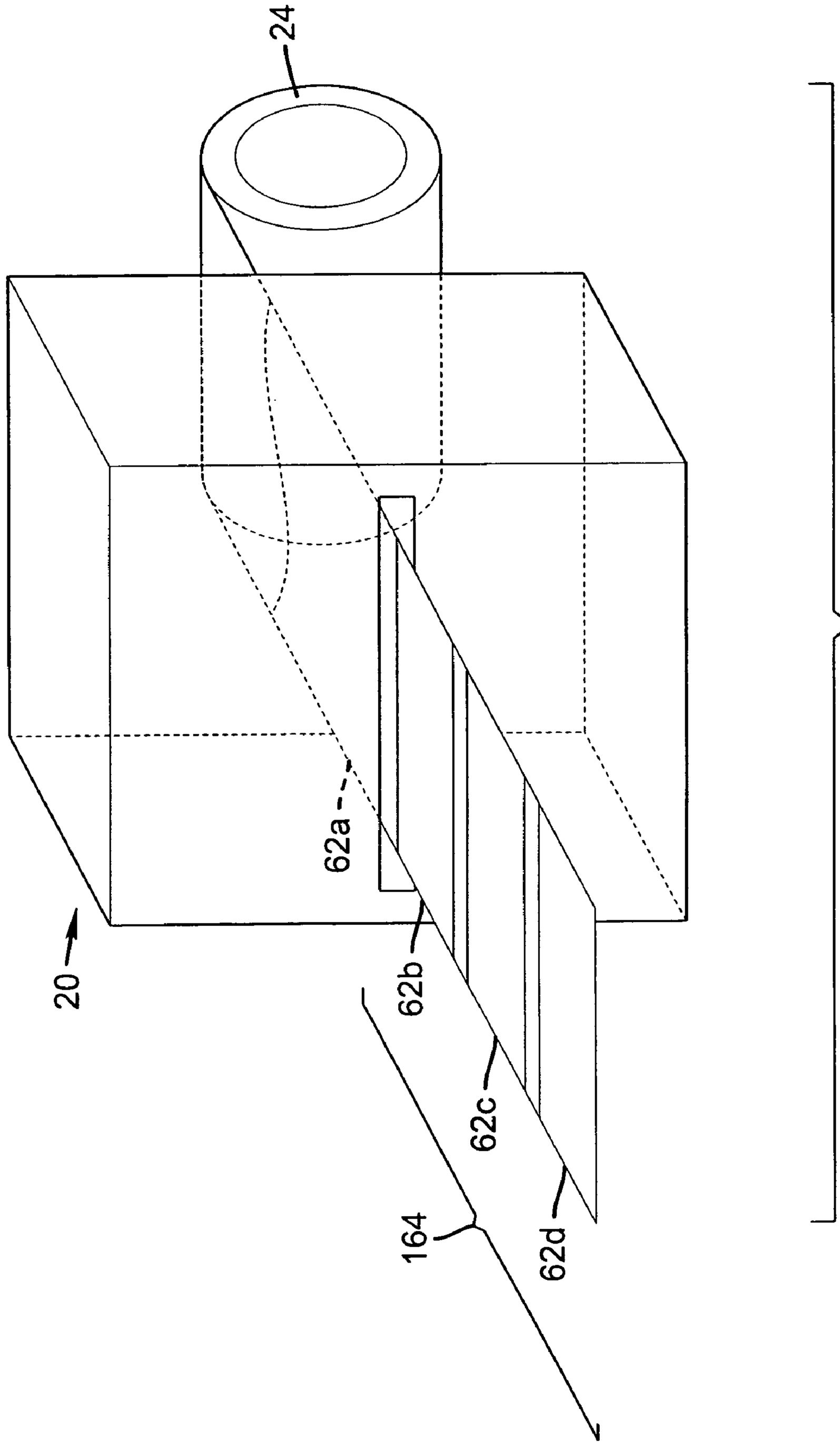


FIG. 14

PRINTER WITH VARIABLE LEAD ADVANCE

FIELD OF THE INVENTION

The invention relates to the field of printers that use rolled receiver medium.

BACKGROUND OF THE INVENTION

A wide variety of printers record images on receiver medium such as paper, fabrics, or films that are specially treated at least one side in order to facilitate the formation of images thereon or to provide enhanced stability of an image printer thereon. In some of these printers, such receiver mediums are provided in roll form with the receiver medium being rolled with the treated side facing outward. This arrangement enables the components of a printer that uses such a rolled receiver medium to be arranged in relatively compact form factor. However, this creates a risk that the specially treated side will be brought into contact with the hands of an operator when manipulation of the receiver medium is necessary, such as to load receiver medium or to clear jams. Further, it will be appreciated that during loading of the receiver medium or at various times during the use of such a rolled receiver medium, there exists a risk that contaminants will be released and will contact the specially treated surface of the receiver medium. Such manual or contaminant contact can have deleterious effects on the receiver medium, including but not limited to altering the distribution or concentration of treated materials on the treated surface, introducing contaminates on the treated side or by compressing, reshaping, stretching, creasing, or tearing the receiver medium.

Where contact causes such deleterious effects it can be difficult to provide a printed image having an appropriate appearance using the affected receiver medium. Further, where a receiver medium that is torn, stretched, or contaminated as a result of contact, the use of such receiver medium can seriously interrupt the use of the printer by contaminating a series of subsequent printing operations or by ripping, tearing or otherwise failing in a manner that interferes with the flow of receiver medium through the printer or with other operations of the printer.

One possible approach to addressing this problem is to use special packaging materials to package rolled medium so that a user can load a rolled medium, without directly touching the medium. For example, U.S. Pat. No. 5,839,839, entitled "INK FILM REFILL FOR HEAT-TRANSFER PRINTER" filed on Jan. 31, 1997 by Brot et al. describes a removable wrapping that is applied around a rolled donor medium at the time of manufacture. This wrapping is shaped and positioned so that it covers areas of the receiver medium that are likely to be contacted during loading. In some instances, the wrapping contains printed instructions that illustrate or describe a loading process that a user is to use that will only require manipulation of the wrapped portion of the receiver medium. After loading, the wrapping is discarded.

However, it will be appreciated that this approach merely provides protection for the rolled medium during an initial loading process. However, this does not protect the receiver medium against deleterious effects caused by manual or contaminant contact with the receiver medium at any time after the receiver medium is loaded. For example, the approach of the '839 patent is ineffectual when it may be necessary or desirable for a user to remove and reload rolled medium such as to clear paper jams or to switch from one type of receiver medium to another type receiver medium. Similarly, the approach of the '839 patent does not protect the rolled medium from contamination that contact can occur after loading of the rolled medium.

Another approach has been to preprogram printers that use rolled receiver medium to discard a predetermined length of such receiver medium upon loading. One example of a prior art printer **10** of this type is illustrated in FIG. **1**. As is illustrated in FIG. **1**, when an unused roll **14***a* of receiver medium **12** is loaded, prior art printer **10** advances receiver medium **12** by a predetermined length. In this illustration, the predetermined length is equivalent to six printable image frames **16***a*-**16***f*. Typically, this predetermined length is intended to be long enough so that when unused roll **14***a* of receiver medium **12** is loaded into prior art printer **10**, a length equal to an entire circumferential length of unused roll **14***a* of receiver medium **12** is discarded. This approach avoids the use of potentially contacted receiver medium **12** by discarding an outermost layer of receiver medium **12** and allowing use of other layers that were effectively wrapped by the outermost layer at the time of the potential contact.

While this approach is useful and simple to implement, it can be wasteful when a used roll **14***b* of receiver medium is reloaded into prior art printer **10** as may occur during printer maintenance or as may occur when a user wishes to use different types of receiver medium.

FIG. **2** illustrates an example of how this waste can occur. As illustrated in FIG. **2**, used roll **14***b* of receiver medium **12** has a circumference **18***b*, that is substantially smaller than the circumference **18***a* of the unused roll **14***a* of receiver medium **12**. The length of receiver medium **12** that may be subject to contact during loading or reloading is smaller than the length of receiver medium **12** that may be subject to contact if an unused roll **14***a* of receiver medium **12** had been located in printer **20**. However, the prior art printer **10** discards the same length L of receiver medium **12**, including in this example, six image frames **16***a*-**16***f*. Thus, such a prior art printer **10** discards excess receiver medium. In printers such as thermal printers where donor ribbon and receiver medium are sold in matched combinations, this can cause user of the prior art printer **10** to have an apparent excess of donor ribbon after receiver medium **12** is exhausted. This can lead such users to assume that they have not been provided with the appropriate amounts of receiver medium **12**, which in turn, can lead to user dissatisfaction.

What is needed therefore is a method for operating a printer that minimizes the potential risks imposed by the use of receiver medium that has potentially been compromised through manual or contaminant contacts.

SUMMARY OF THE INVENTION

In one aspect of the invention, a method for operating a printer that prints using a receiver medium having a rolled portion with layers of rolled receiver medium leading to an outermost layer from which an unrolled portion of the receiver medium extends to a print engine. The method comprises the steps of: sensing a condition indicating the receiver medium may have been contacted by other than a component of the printer or by a donor material applied by the print engine; measuring an aspect of the receiver medium indicative of the circumferential length of the outermost layer; determining a circumferential length of the receiver medium based upon the measured aspect of the rolled portion of the receiver medium; determining an exclusion length of the receiver medium based upon the determined circumferential length and a travel distance that is a representation of a length of the unrolled portion between the rolled portion and the

print engine; and automatically advancing the receiver medium by the exclusion length so that a subsequent printed image by the printer will be printed using a portion of the receiver medium that was not directly subject to the possibility of such contact.

In another aspect of the invention, a printer is provided. The printer comprises: a medium advance including a roll receiving area for receiving a rolled portion of a receiver medium having a preferred side for use in recording images during printing with the receiver medium being rolled so that the preferred side faces outward of the roll, the medium advance having a motorized system for advancing an unrolled portion of the receiver medium away from the rolled portion of the receiver medium to a print engine that is adapted to use the preferred side for recording images; a sensor system having a receiver medium sensor located at the roll receiving area and adapted to provide signals from which a processor can determine a circumferential length of the rolled portion of the receiver medium; the sensor system further having a condition sensor adapted to detect at least one condition that can be used to determine when a possibility exists that the preferred side of the receiver medium has been in contact with something other than a component of the printer or a donor material applied by the print engine, the condition sensor generating a signal from which the possibility of such contact can be determined. A processor is operatively connected to the medium advance, the print engine, the receiver medium sensor, and the detector system. The processor is adapted to determine from the signal that a possibility exists that the preferred side of the receiver has been in contact with something other than a component of the printer or a donor medium applied by the print engine. When such a condition is detected, the processor further is operable to determine a circumferential length based upon signals received from the receiver medium sensor to select an exclusion length of receiver medium based upon the determined circumferential length and a length representing a length of the unrolled portion; and to cause the medium advance to advance the receiver medium by at least the exclusion length so that portions of the receiver medium that have potentially been contacted, are not used for printing; wherein the selected non-printing length is proportional to the measured aspect of the receiver medium.

In still another aspect of the invention, a printer is provided. The printer comprises: a medium advance including a roll receiving area for receiving a rolled portion of a receiver medium having a preferred side for use in recording images during printing and a receiver medium path leading to a print engine, the receiver medium being rolled so that the preferred side faces outward of the spool, the medium advance having a motorized system for advancing an unrolled portion of the receiver medium away from the rolled portion to a print engine that is adapted to use the preferred side for recording images; a sensor system having a receiver medium sensor located at the roll receiving area and adapted to provide signals from which a processor can determine a circumferential length of the rolled portion of the receiver medium currently rolled onto the loaded spool and a condition sensor adapted to detect at least one condition indicating that a possibility exists that the exposed side of the receiver medium has been in contact other than with a component of the printer or print engine applied donor material, the sensor generating a signal from which a processor can determine the existence of such a possibility of contact. A processor is operatively connected to the medium advance, the sensor system, and the print engine. The processor is adapted to determine when a condition exists suggesting that the receiver medium may have been contacted and, when such a condition is detected, the processor further being operable to determine a circumferential length of the rolled portion based upon signals received from the receiver medium sensor to select an exclusion length of receiver medium based upon the assigned circumferential length designation; and to cause the medium advance to advance the receiver medium in a manner that excludes from printing a length of the receiver medium beginning at a start point of the receiver medium to extending at least by the exclusion length of the receiver medium; wherein the selected exclusion length is proportional to the measured aspect of the receiver medium.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a prior art printer with an unused roll of receiver medium advanced in accordance with the prior art;

FIG. **2** illustrates a prior art printer with a used roll of receiver medium advanced in accordance with the prior art;

FIG. **3** shows one embodiment of a printer;

FIG. **4** shows one embodiment of a method for operating a printer;

FIG. **5** shows an embodiment of a receiver medium storage area;

FIGS. **6-10** illustrate the operation of one embodiment of a receiver medium sensor;

FIG. **11** illustrates another embodiment of a receiver medium sensor;

FIG. **12** illustrates another embodiment of a receiver medium sensor; and

FIGS. **13** and **14** illustrate another embodiment of a printer.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **3** shows one embodiment of a printer **20**. In the embodiment of FIG. **1**, printer **20** comprises a housing **21** having a print engine **22** that applies markings or otherwise forms an image on a receiver medium **24**. Print engine **22** can record images on receiver medium **24** using a variety of known technologies including, but not limited to, conventional four color offset separation printing or other contact printing, silk screening, dry electrophotography such as is used in the NexPress 2100 printer sold by Eastman Kodak Company, Rochester, N.Y., USA, thermal printing technology, drop on demand ink jet technology and continuous inkjet technology. For the purpose of the following discussions, print engine **22** will be described as being of a type that generates color images. However, it will be appreciated that this is not necessary and that the claimed methods and apparatuses herein can be practiced with a print engine **22**, monotone images such as black and white, grayscale or sepia toned images.

A medium advance **26** is used to position a receiver medium **24** and/or print engine **22** relative to each other to facilitate recording of an image **64** on receiver medium **24**. Medium advance **26** can comprise any number of well-known systems for moving receiver medium **24** within printer **20**, including motor **28**, driving pinch rollers **30**, a motorized platen roller (not shown) or other well-known systems for the movement of paper or other types of receiver medium **24**. Typically medium advance **26** positions receiver medium **24** and or print engine **22** such that print engine **22** can print an image **64** in an image frame **62***a*-**62***g* on receiver medium. Image frame **62***a*-**62***g* typically represents a maximum image size that print engine **22** can print on receiver medium **24** without advancing the same.

Print engine **22**, medium advance **26** and color sensing system **60** are operated by a processor **34**. Processor **34** can include, but is not limited to, a programmable digital computer, a personal computer system, a programmable microprocessor, a programmable logic processor, a series of electronic circuits, a series of electronic circuits reduced to the form of an integrated circuit, or a series of discrete components. Processor **34** can be a single unit or a combination of separate processing units connected by a communication link. Certain functions of processor **34** described herein may be performed by a portion of a processor **34** that is within housing **21**, while other portions can be performed by a portion of processor **34** that is exterior to housing such as, for example, a personal computer that is connected to printer **20** by way of a wired or wireless connection. Processor **34** operates printer **20** based upon input signals from a user input system **36**, sensors **38**, a memory **40** and a communication system **54**.

User input system **36** can comprise any form of transducer or other device capable of receiving an input from a user and converting this input into a form that can be used by processor **34**. For example, user input system **36** can comprise a touch screen input, a keyboard, a keypad, a mouse, a touch pad input, a 4-way switch, a 6-way switch, an 8-way switch, a stylus system, a trackball system, a joystick system, a voice recognition system, a gesture recognition system or other such systems.

Sensors **38** are optional and can include light sensors and other sensors known in the art that can be used to detect conditions in the environment surrounding image **32** and to convert this information into a form that can be used by processor **34** in governing operation of print engine **22**, medium advance **26** and/or other systems of printer **20**. Sensors **38** can include audio sensors adapted to capture sounds. Sensors **38** can also include positioning and other sensors used internally to control printer operations.

Memory **40** can include conventional memory devices including solid state, magnetic, optical or other data storage devices. Memory **40** can be fixed within printer **20** or it can be removable. In the embodiment of FIG. **1**, printer **20** is shown having a hard drive **42**, a disk drive **44** for a removable disk such as an optical, magnetic or other disk memory (not shown) and a memory card slot **46** that holds a removable memory **48** such as a removable memory card and has a memory interface **50** for communicating with removable memory **48**.

In the embodiment shown in FIG. **3**, printer **20** has a communication system **54** for communicating with a remote memory system **52**, a remote display **56**, and a remote input **58**, such as a remote keyboard **58***a*, a remote mouse **58***b* or a remote control **58***c* and, optionally with a local display **66**, and/or a local input **68**. Communication system **54** can be for example, an optical, radio frequency or transducer circuit or other system that converts image and other data into a form that can be conveyed to a remote device such as remote memory system **52** or remote display **56** by way of an optical signal, radio frequency signal or other form of signal. Communication system **54** can also be used to receive a digital image and other information from a host computer or network (not shown). In this way, data including, but not limited to, control programs, digital images and metadata can also be stored in remote memory system **52** that is external to printer **20** such as a personal computer server, computer network or other digital data storage system. Communication system **54** provides processor **34** with information and instructions from signals received thereby.

In the embodiment illustrated, local display **66** communicates with processor **34** without involvement of communication system **54**. Similarly, local input **68** comprising a local keyboard **68***a* and a local mouse **68***b* also communicates with processor **34** without involvement of communication system **54**. However, in other embodiments such communication can be made by way of communication system **54** if desired.

Turning now to FIGS. **3** and **4**, what is shown, respectively, is one embodiment of a printer and a method for operating a printer. In a first step of this method, processor **34** detects a signal from one of sensors **38** from which processor **34** can determine the existence of a condition indicating that a receiver medium **24** in printer **20** may have been contacted by something other than a component of printer **20** or a donor material applied to a print engine (step **100**). There are a variety of ways in which processor **34** can do this. In one embodiment, the condition indicating that a receiver medium **24** in printer **20** may have been contacted comprises a condition that indicates that a storage area for a receiver medium **24** has been accessed. For example, in the embodiment illustrated in FIG. **3**, a receiver medium storage area **80** comprises a receiver medium storage area **80** comprising in this embodiment an enclosure with an enclosure area **82**, a door **84**, and a door sensor **86** that is positioned proximate to opening and adapted to detect when the door **84** is opened. In this embodiment, receiver medium storage area **80** is arranged so that access to a rolled portion **72** of receiver medium **24** requires opening door **84** in a manner that can be sensed by door sensor **86**. Such a door sensor **86** can comprise, for example, an optical or mechanical or so-called Hall effect switch that is positioned by door **84** to detect movement thereof and which can generate a signal from which processor **34** can determine that door **84** has been opened. When processor **34** determines that door **84** has been opened, processor **34** can determine that a condition exists that indicates that the receiver medium **24** may have been contacted by something other than a component of the printer or a donor material applied by printer engine **22**.

In another embodiment illustrated in FIG. **5**, receiver medium storage area **80** can comprise a shaft **90** onto which rolled portion **72** of receiver medium **24** is loaded and a shaft switch **92** positioned on shaft **90** so that shaft switch **92** will be actuated either by the act of removing rolled portion **72** of receiver medium **24** from shaft **90** or by the act of loading rolled portion **72** of receiver medium **24** onto shaft **90**. In the example, shaft switch **92** is located at a position shaft **90** in a manner that causes shaft switch **92** to be closed whenever a rolled portion **72** is loaded onto shaft **90**. In this embodiment, a processor **34** determines that there is a possibility that a receiver medium **24** may have been contacted by detecting a pattern of signals from shaft switch **92** indicating that a rolled portion **72** of receiver medium **24** has been loaded.

In another embodiment, processor **34** and sensors **38** can cooperate to detect errors that can occur during operation of printer **20** and that suggest that a receiver medium **24** may have been manipulated to correct an error condition. For example, processor **34** and sensors **38** can detect error conditions suggesting that a "jam" has occurred in medium advance **26** preventing receiver medium **24** from freely moving within the medium advance **26**. Where such conditions are detected, processor **34** typically causes a signal to be sent advising a user to contact the receiver medium to clear the "jam". Accordingly, when processor **34** receives signals from sensors **38** that detect such "jams" that alternately indicate that a "jam" exists and that the "jam" has subsequently been corrected, processor **34** can determine that it is possible that receiver medium **24** may have been contacted. There are of a

variety of sensors **38** and control strategies that are known in the art and that can be applied for the purpose of sensing so-called jam conditions, any one of which can be applied for this purpose.

It will be appreciated that, depending upon the design of printer **20**, the uses to which printer **20** is put and the type of receiver medium **24** that is used, there may be a variety of additional conditions that can be sensed by sensors **38** that may indicate to processor **34** that there is a possibility that receiver medium **24** has been contacted including, but not limited to, a signal indicating that a roll of receiver medium is fully used or a signal indicating that donor material has been replaced or has escaped contamination.

An aspect of receiver medium **24** indicative of the circumferential length of receiver medium is then measured (step **102**). The measured aspect can be any of a number of characteristics of the rolled portion **72** of receiver medium **24**. A receiver medium sensor **122** is used to measure the aspect of receiver medium **24**.

FIGS. **6-10** illustrate one example of a receiver medium sensor **122** that is capable of measuring an aspect of rolled portion **72** of receiver medium **24** that is indicative of the circumferential length of outermost layer **76** of receiver medium **24**. In this embodiment, receiver medium sensor **122** comprises a lever arm **124** biased by a biasing member **134** such as a spring about a pivot **135** so that a first end **126** is held against receiver medium **24**. In this embodiment, a resilient roller **133** provides a low friction engagement surface that allows contact with outermost layer **76** of rolled portion **72**. A second end **128** of lever arm **124** is positioned for movement along an arcurate path **130** beginning at a full position illustrated in FIG. **6** that the second end **128** is moved into when the first end **126** is biased against an outermost layer **76***a* of a rolled portion **72** of receiver medium **24** that has not yet been used and continuing through a range of positions illustrated, for example, in FIGS. **7**, **8** and **9** to exhausted position illustrated in FIG. **10** that second end **128** is moved into when first end **126** is biased against when receiver medium **24** is exhausted. As is illustrated in FIG. **10**, an optional stop **137** prevents further biased movement of lever arm **124** when lever arm **124** is at the exhausted position. For comparison, purposes a phantom outline is provided in FIGS. **7-10** depicting the positions of lever arm **124** and the outermost layer **76***a*-**76***e* of rolled portion **72** of receiver medium **24**.

As is illustrated in FIGS. **6-10**, a position sensor system **132** is provided and is capable of generating signals that can be used by processor **34** to determine the position of second end **128** relative to the exhausted position (FIG. **11**) or the unused position (FIG. **7**). In the embodiment of FIGS. **6-10**, position sensor system **132** comprises a plurality of individual second end sensors **136***a*-**136***f*, such as switches or electrical contacts, within arcurate path **130**, each second end sensor **136***a*-**136***f* being located at a position that is associated with a different range of circumferential lengths of receiver medium **24** and each being adapted to provide a signal to processor **34** when second end **128** is proximate thereto. Signals from position sensor system **132** are then provided to processor **34**.

In still another alternative embodiment illustrated in FIG. **11**, receiver medium sensor **122** can comprise a weight sensor **96** that is positioned on a shaft **90** on which rolled portion **72** of receiver medium **24** is loaded. Weight sensor **96** is adapted to detect a weight of rolled portion **72** and to provide a signal to processor **34** from which processor **34** can determine a circumferential length thereon and from this can determine a circumferential length of outermost layer **76** of the rolled portion **72** of receiver medium **24**. The receiver medium sensor **122** can be adapted to measure distance from the outermost layer **76** of a rolled portion **72** of receiver medium **24** to a fixed point in the printer **20** proximate to area **80** for receiving rolled portion **72** of receiver medium **24**. It will be appreciated that weight sensor **96** can also perform the function of shaft switch **92**.

One example embodiment of this type is illustrated in FIG. **12**, in which the receiver medium sensor **122** comprised an optical or sonic sensor having an emitter **150** and a sensor **152** positioned in receiver medium storage area **80** and directed from a fixed portion thereof onto the outermost layer **76**. The emitter **150** generates a first optical or sonic signal, while the sensor **152** receives a reflected portion thereof, and provides a signal indicative the magnitude of the reflected portion, the magnitude of the reflected portion being indicative of a distance from the receiver medium sensor **122** to the outermost layer **76**.

Processor **34** then determines a circumferential length of the rolled portion **72** of receiver medium **24** (step **104**). This determination is made based upon the measured aspect of the rolled portion **72** of receiver medium **24**. Typically, this determination can be made based upon a look up table or other preprogrammed logical association between the measured aspect and the circumferential length. However, the circumferential length can also be calculated by processor **34** using geometric equations where the measured aspect of the outermost layer of the rolled portion **72** of receiver medium **24** is amenable for use in such equations.

Processor **34** then selects an exclusion length **160** (step **106**) for the receiver medium **24** based upon the determined circumferential length (step **104**). Exclusion length **160** can be equal to the circumferential length or it can be longer.

It will be appreciated that unrolled portion **74** receiver medium **24** travels along a path of some length from rolled portion **72** and that to advance all of receiver medium **24** past print engine **22**, it is necessary to advance the determined circumferential length plus a distance that represents the distance from the rolled portion **72** to print engine **22**. This is, of course, generally a distance that can be determined based upon the length of the unrolled portion **74** of receiver medium **24**. Accordingly, the exclusion length can be established to include a length that corresponds to the length of unrolled portion **74** plus the determined circumferential length.

The exclusion length **160** can be measured in any of a variety of ways. In the embodiment illustrated in FIGS. **13** and **14**, exclusion length **160** is shown as being measured in units of image frames **62***a*-**62***g*.

Receiver medium **24** is then advanced by the exclusion length (step **108**) so that any portion of receiver medium **24**, that might have been contacted, is moved past print engine **22** so that such portions will not be used for printing.

Accordingly, when an unused roll **14***a* of receiver medium **24** is loaded into printer **20** as illustrated in FIG. **13**, processor **34** will determine a first exclusion length **162** that extends for five image frames **62***a*-**62***e*. However, processor **34** will determine a second exclusion length **164** that extends for only 3 image frames when a used roll **14***b* of receiver medium **24** is loaded into printer **20**. In other embodiments, an exclusion length can be determined using other units of receiver medium advance

The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

PARTS LIST

10 prior art printer
12 receiver medium
14*a* unused roll
14*b* used roll
16*a*-**16***f* image frames
18*a*, **18***b* circumference

20 printer
21 housing
22 print engine
24 receiver medium
26 medium advance
28 motor
30 pinch rollers
34 processor
36 user input system
38 sensors
40 memory
42 hard drive
44 removable disk drive
46 memory card slot
48 removable memory
50 memory interface
52 remote memory system
54 communication system
56 remote display
58 remote input
58*a* remote keyboard
58*b* remote mouse
58*c* remote control
62*a*-**62***e* image frame
64 image
66 local display
68 local user input
68*a* local keyboard
68*b* local mouse
72 rolled portion of receiver medium
74 unrolled portion
76 outermost layer
76*a*-**76***e* outermost layer
80 receiver medium storage area
82 enclosure area
84 door
86 door sensor
90 shaft
92 shaft switch
96 weight sensor
100 detect condition step
102 measure aspect step
104 determine circumferential step
106 determine exclusion length step
108 advance receiver medium step
122 receiver medium sensor
124, **124***a* lever arm
126 first end
128 second end
130 arcurate path
132 sensor system
133 roller
134 biasing member
135 pivot
136*a*-**136***f* second end sensor
137 stop
150 emitter
152 sensor
160 exclusion length
162 first exclusion length
164 second exclusion length
L prior art fixed exclusion length

The invention claimed is:

1. A method for operating a printer that prints using a receiver medium comprising a rolled portion having layers of rolled receiver medium leading to an outermost layer from which an unrolled portion of the receiver medium extends to a print engine; the method comprising the steps of:

sensing a condition indicating that the receiver medium may have been contacted other than by a component of the printer or by a donor material applied by a print engine of the printer;

measuring an aspect of the rolled portion of the receiver medium indicative of the circumferential length of the outermost layer of the rolled portion of the receiver medium;

determining a circumferential length of the rolled portion of the receiver medium based upon the measured aspect of the rolled portion of the receiver medium;

determining an exclusion length of the receiver medium based upon the determined circumferential length and a travel distance that is a representation of a length of the unrolled portion from the rolled portion to the print engine; and

automatically advancing the receiver medium by the exclusion length so that a subsequent image printed by the printer will be printed using a portion of the receiver medium that was not directly subject to the possibility of such contact.

2. The method of claim **1**, wherein the measured aspect comprises a circumference of the rolled portion of the receiver medium.

3. The method of claim **1**, wherein the measured aspect comprises a distance from the outermost layer of the receiver medium to a fixed point in the printer relative thereto.

4. The method of claim **1**, wherein the measured aspect comprises a distance from an axis upon which the rolled portion of the receiver medium is loaded to the outermost layer.

5. The method of claim **1**, wherein the exclusion length of the receiver medium is determined in terms of unit lengths of the receiver medium with each unit length being associated with a length of the receiver medium that is used for printing an image frame.

6. The method of claim **1**, further comprising the step of excising the portions of the receiver medium that were advanced.

7. The method of claim **1**, wherein the measured aspect comprises a radius of the rolled portion of the receiver medium or a diameter of the rolled portion of the receiver medium.

8. The method of claim **1**, wherein the condition indicating that the roll of receiver medium in the printer may have been contacted comprises a condition that indicates that a receiver medium has been loaded into the printer.

9. The method of claim **1**, wherein the condition indicating that a receiver medium that is loaded in the printer may have been contacted comprises an error condition of a type that is likely to require manipulation of the receiver medium to resolve the error condition.

10. The method of claim **1**, wherein the condition indicating that a receiver medium may have been contacted comprises a detected condition indicating that a printer enclosure for the receiver medium has been opened.

11. A printer comprising:

a medium advance including a roll receiving area for receiving a rolled portion of a receiver medium having a preferred side for use in recording images during printing and a receiver medium path leading to a print engine, said receiver medium being rolled so that the preferred side faces outward of the roll, said medium advance having a motorized system for advancing an unrolled portion of the receiver medium away from the rolled

portion to a print engine that is adapted to use the preferred side for recording images;

a sensor system having a receiver medium sensor located at the roll receiving area and adapted to provide signals from which a processor can determine a circumferential length of the rolled portion of the receiver medium and said sensor system further having a sensor adapted to detect at least one condition indicating that a possibility exists that the preferred side of the receiver medium has been in contact other than with a component of the printer or a print engine applied donor material, said sensor system generating a signal that can be used to determine when a possibility exists that the preferred side of the receiver medium has been in contact with something other that a component of the printer or a donor material applied to the print engine; and

said processor operatively connected to the receiver medium transport system, the print engine and the sensor system, said processor being adapted to determine from signals provided by the sensor system when a condition exists suggesting that there may have been contamination of the receiver medium and, when such a condition is detected, said processor further being operable to determine a circumferential length based upon signals received from the receiver medium sensor to select an exclusion length of receiver medium based upon the determined circumferential length, and a length representing a length of the unrolled portion from the rolled portion to the print engine; and to cause the receiver medium transport system to advance the receiver medium by at least the exclusion length so that portions of the receiver medium that have potentially been contacted are excluded from printing;

wherein said selected non-printing length is proportional to the measured aspect of the receiver medium.

12. The printer of claim **11**, wherein a plurality of second end sensors are provided within the arcurate path, each sensor being located at a position that is associated with a different range of circumferential lengths of the receiver medium and wherein said processor selects an exclusion length of the receiver medium based upon which one of the position sensors detects the second end.

13. The printer of claim **11**, wherein the receiver medium sensor comprises an optical or sonic sensor positioned in the receiver medium receiving area and directed from a fixed portion thereof onto the outermost layer, said receiver medium sensor being adapted to generate a first optical or sonic signal, to receive a reflected portion thereof, and to provide a signal indicative the magnitude of the reflected portion, said magnitude being indicative of a distance from the optical or sonic sensor to the outermost layer.

14. The printer of claim **11**, wherein said receiver medium receiving area comprises an enclosure with an opening, and wherein said printer further comprises an enclosure sensor adapted to detect when the opening has been opened and generating a signal from which the processor can determine that a condition exists that may indicate that the receiver medium may have been contacted.

15. The printer of claim **11**, wherein said printer comprises a shaft onto which the rolled receiver medium is loaded and a switch positioned on the shaft so that the switch will generate a signal when the roll of receiver medium is removed from the shaft or loaded onto the shaft, and wherein the processor uses the signal.

16. A printer comprising:

a receiver medium transport system including a roll receiving area for receiving a rolled portion of a receiver medium having a preferred side for use in recording images during printing and a receiver medium path leading to a print engine, said receiver medium being rolled so that the preferred side faces outward of a spool, said receiver medium transport system having a motorized system for advancing an unrolled portion of the receiver medium away from the rolled portion to a print engine that is adapted to use the preferred side for recording images;

a sensor system having a receiver medium sensor located at the roll receiving area and adapted to provide signals from which a processor can determine a circumferential length of the rolled portion of the receiver medium currently rolled onto the loaded spool;

a sensor adapted to detect at least one condition indicating that a possibility exists that the exposed side of the receiver medium has been in contact other than with a component of the printer or a print engine applied donor material, said sensor generating a signal from which a processor can determine the existence of such a possibility of contact; and

said processor operatively connected to the receiver medium transport system, the sensor system, the print engine and the receiver medium sensor, said processor being adapted to determine when a condition exists suggesting that the receiver medium may have been contacted and, when such a condition is detected, said processor further being operable to determine a circumferential length of the rolled portion based upon signals received from the receiver medium sensor to select an exclusion length of receiver medium based upon the assigned circumferential length designation; and to cause the receiver medium transport system to advance the receiver medium in a manner that excludes from printing a length of the receiver medium beginning at a point of the receiver medium confronting the print engine and extending at least by the exclusion length of the receiver medium;

wherein said selected exclusion length is proportional to the measured aspect of the receiver medium.

17. The printer of claim **16**, wherein the detection system detects at least one of a replacement of a donor supply, a roll of receiver medium or a printer error condition possibly requiring manipulation of the receiver medium.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

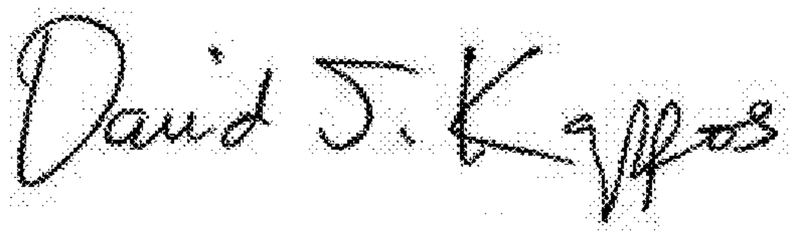
CERTIFICATE OF CORRECTION

PATENT NO. : 7,907,290 B2
APPLICATION NO. : 11/317922
DATED : March 15, 2011
INVENTOR(S) : Robert Frederic Mindler et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column	Line	
11	37	In Claim 12, delete "arcurate" and insert -- arcuate --, therefor.
11	49	In Claim 13, delete "indicative the" and insert -- indicative of the --, therefor.

Signed and Sealed this
Twenty-sixth Day of July, 2011



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